L Number	Hits	Search Text	DB	Time stamp
1	1	("5155336").PN.	USPAT; US-PGPUB	2002/06/08 09:53
2	4	(("4818327") or ("5155337") or ("5418885") or ("5444815")).PN.	USPAT; US-PGPUB	2002/06/08 09:56
3	24	selectively with control with temperature same wafer	USPAT; US-PGPUB	2002/06/08 10:06
4	1	("0454814").PN.	USPAT; US-PGPUB	2002/06/08 10:05

DOCUMENT-IDENTIFIER: US 5436172 A
TITLE: Real-time multi-zone semiconductor wafer temperature and process
uniformity control system

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ABPL:
A real-time multi-zone semiconductor **wafer** temperature and process uniformity
control system for use in association with a semiconductor **wafer** fabrication
reactor comprises a multi-zone illuminator (130), a multi-point temperature
sensor (132), and process control circuitry (150). The method and system of
the invention significantly improved **wafer** (60) temperature control and process
uniformity. The multi-zone illuminator module (130) selectively and
controllably heats segments of the semiconductor **wafer** (60). Multi-point
temperature sensor (132) independently performs pyrometry-based temperature
measurements of predetermined points of the semiconductor **wafer** (60). Process
control circuitry (150) operates in association with the multi-zone illuminator
(130) and the multi-point **temperature** sensor (132) for receiving the
temperature measurements and **selectively** controlling the illuminator module to
maintain uniformity in the **temperature** measurements. A scatter module (116)
also provides input to process control circuitry (150) for real-time emissivity
compensation of the pyrometry-based temperature measurements of semiconductor
wafer (60).

BSPR:
According to one aspect of the invention, the system comprises in association a
multi-zone illuminator, a multi-point temperature sensor,

and process control
circuitry. The multi-zone illuminator module selectively and controllably
heats segments of the semiconductor **wafer**. The multi-point temperature sensor
independently performs pyrometry-based temperature measurements of
predetermined points of the semiconductor **wafer**. Process **control** circuitry
operates in association with the multi-zone illuminator and the multi-point
temperature sensor for receiving the **temperature** measurements and **selectively**
controlling the illuminator module to maintain uniformity in the **temperature**
measurements. A scatter module also provides input to process control
circuitry for real-time emissivity compensation of the pyrometry-based
temperature measurements of semiconductor **wafer**.

DOCUMENT-IDENTIFIER: US 5846375 A
TITLE: Area specific temperature control for electrode plates and chucks used
in semiconductor processing equipment

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ABPL:
A **temperature control** system to **selectively control the temperature** of specific
areas of the chuck or electrode plate upon which a **wafer** is mounted during
plasma etching, chemical vapor deposition and other such **temperature** dependent
processes for the purpose of ultimately controlling the **temperature** of the
semiconductor **wafer**. The temperature control system includes a plurality of
conduits arranged about the center of the chuck as a series of concentric
radially adjacent loops. Each conduit is connected to its own inlet and outlet
to allow a heating or cooling agent to flow independently through each conduit.

BSPR:
Accordingly, it is desirable to have a chuck or electrode plate **temperature**
control system that is capable of providing a desired **temperature** profile or
gradient across the **wafer by selectively** heating or cooling specific areas of
the **wafer**. One system proposed for achieving either a uniform or non-uniform
temperature gradient/profile across a CVD platen is disclosed in Carman et al.,
U.S. Pat. No. 5,294,778 issued Mar. 15, 1994 and entitled CVD Platen Heater
System Utilizing Concentric Electric Heating Elements. The Carman patent
describes a multiple coil electrical resistance heater system buried in a CVD
platen. The system consists of three elements--a spiral shaped main heating

coil and inner and outer single heating loops. Electrical power to each of the individual resistance heaters can be varied to provide a uniform flat temperature profile or a smooth temperature gradient across the platen. The resistance heating system of Carman, of course, cannot provide the cooling required in semiconductor fabrication processes such as plasma etching to preserve the integrity of the photoresist. In addition, the use of a spiral coil as the main heating element limits the extent to which area specific heating can be achieved.